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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/502,404 02/10/00 MEIBURGER

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MM91/1017

EXAMINER

NOVEMBER

ART UNIT

PAPER NUMBER

2001

DATE MAILED:

10/17/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/502,534

Applicant(s)

Meisburger et al.

Examiner

K. NGUYEN

Group Art Unit

2881

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- ☐ Responsive to communication(s) filed on _____
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- ☒ Claim(s) 1-61 is/are pending in the application.
- Of the above claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1-61 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or selection requirement.

Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
 - ☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been received.
 - ☐ received in Application No. (Series Code/Serial Number) _____
 - ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

Attachment(s)

- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 9
- ☒ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Interview Summary, PTO-413
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Other _____

Office Action Summary

Applicant is requested to amend the specification that both the applications having serial Nos. 09/502,120 and 09/502,534 are a reissue of U.S. Application No. 08/606,854 filed February 26, 1996, now patent No. 5,717,204.

1) This application is objected to under 37 CFR 1.172(a) as lacking the written consent of all assignees owning an undivided interest in the patent. The consent of the assignee must be in compliance with 37 CFR 1.172. See MPEP § 1410.01.

A proper assent of the assignee in compliance with 37 CFR 1.172 and 3.73 is required in reply to this Office action.

2) The reissue oath/declaration filed with this application is defective because it fails to identify at least one error which is relied upon to support the reissue application. See 37 CFR 1.175(a)(1) and MPEP § 1414.

3) The reissue oath/declaration filed with this application is defective because it fails to contain a statement that the inventor is a "the original, first and sole" or "the original, first and joint" inventor as required by 37 CFR 1.63(a)(4) and further fails to contain a statement that all errors which are being corrected in the reissue application up to the time of filing of the oath/declaration arose without any deceptive intention on the part of the applicant. See 37 CFR 1.175 and MPEP § 1414.

4) Claims 1-61 are rejected as being based upon a defective reissue declaration under 35 U.S.C. 251 as set forth above. See 37 CFR 1.175.

The nature of the defect(s) in the declaration is set forth in the discussion above in this

Office action.

5)

Objected Informalities

The disclosure is objected to because of the following informalities:

In The Claims

Claim 31, line 2, "a electron" should be changed to -- an electron --.

Claim 37, line 2, "a electron" should be changed to -- an electron --.

Claim 40, line 2, "a electron" should be changed to -- an electron --.

Claim 42, line 2, "a electron" should be changed to -- an electron --.

Claim 55, line 4, "a electron" should be changed to -- an electron --.

Claim 56, line 2, "a electron" should be changed to -- an electron --.

Claim 57, line 1, "column" should be changed to -- claim --.

Claim 58, line 1, "column" should be changed to -- claim --.

Appropriate correction is required.

6)

Rejection Under 35 U.S.C. 112, First Paragraph

Claims 20, 37-39, 48-55 and 59-61 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification is completely silent for description of "surface charging creates a potential which maintains the equilibrium condition" as recited in claim 20; "an electron source ...

per steradian" as recited in claim 37; "an alignment processor to measure differences ... from the database" as recited in claim 48; "the resulting multiple feature images ... overlaid precisely" and "averaging the multiple image features ... the image of the pattern feature" as recited in claims 49 and 59; "an image of a pattern feature produced by averaging between 2 to 256 inclusive repeated frames" as recited in claim 51; "a frame size varied in the range of 512 to 4096 pixels tall by 4 to 4096 wide" as recited in claim 52; and "high energy and low energy electron beams provided from an electron source" as recited in claim 55. Therefore, the examiner don't understand what is the potential maintained the equilibrium condition? How is the electron beam with an irradiance of greater than 1 milli-amp per steradian? How and/or what are the differences measured in alignment between the image and the information from the database? How are the alignment measurements used to align the image and the information from the database? How are the resulting multiple feature images exactly aligned and overlaid precisely? How are the averaging the multiple image features to maximize signal contrast in the image of the pattern feature? and how is the single electron source that provides both high and low energy electron beams at the same time?

Clarification without the introduction of new matter is required.

66 7) ***Rejection Under 35 U.S.C. 112, Second Paragraph***

Claim 30 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 30 recites the limitation "the particle beam column" in line 1. There is insufficient antecedent basis for this limitation in the claim.

8) *Rejection Under 35 U.S.C. 102(b)*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

M → Claims 9-15, 17-22, 26-28 and 30 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Grobman (4,453,086).

M → Claims 9-22 and 26-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyoshi et al. (4,912,052).

Miyoshi et al. disclose, in figs. 1-11, an apparatus for measuring and testing a semiconductor device which includes conductive and insulative regions, and defects (see col. 8, lines 34-36). The apparatus includes an electron beam 21 having a high landing energy; a target 11; backscattered electrons 25; secondary electrons 22, 23 and 24 having a low landing energy; a detector 41; and grid electrodes 31 and 32. The grid electrodes 31 and 32 applied by voltages to control the secondary electrons 22 and/or 23 back to the target 11 for reducing charging resulting from the backscattered electrons and secondary electrons and for keeping at the surface of the target 11 the constant voltage which is called the equilibrium condition. An aperture member is considered to be inherent in the Miyoshi et al. apparatus, since the aperture electrode is in every

the electron apparatus for producing an electron beam, as Miyoshi et al. disclose the electron beam 21 having the spot diameter less than $0.2\ \mu\text{m}$ (see col. 9, lines 39-41).

no → Claims 42, 45-50, 53-55 and 59-61 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka (4,996,434).

Tanaka discloses, in figs. 1-12, an electron beam apparatus for detecting defects in patterns in a mask and/or wafer. The apparatus includes an electron source 3 for providing an electron beam 4; a charged particle beam column 1; a laser interferometer for positioning a stage; an electron detector 39; and a control section 300 which includes comparing means 100 for digitalizing the signal from the electron detector 39, and uses the die-to-database method for detecting defects in the mask by comparing the detected image with the information from the database having CAD data format (see col. 2, lines 64-68 and col. 3, lines 10-20 and lines 33-34).

9) ***Rejection Under 35 U.S.C. 103(a)***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor

and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyoshi et al. in view of Tanaka (4,996,434).

Miyoshi et al. disclose all the features as discussed above except that the detected signals is compared with a reference to detect defects present on the substrate as recited in claim 23; the reference is derived from a corresponding portion of the substrate as recited in claim 24; and the reference is derived from a database as recited in claim 25.

Tanaka (4,996,434) discloses, in figs. 1-12, an electron beam apparatus for detecting defects in patterns in a mask and/or wafer. The apparatus includes a control section 300 using the die-to-database method for detecting defects in the mask by comparing a detected image with the information from the database (see col. 2, lines 64-68 and col. 3, lines 10-20). Therefore, it would have been obvious to one skilled in the art to use the Tanaka's die-to-database method in the Miyoshi et al. apparatus for detecting the defects in the semiconductor device, since the die-to-database method is well known in the art for detecting the defects in the semiconductor device, and Miyoshi et al. and Tanaka both disclose the electron beam apparatus for measuring the semiconductor device.

Using the reference derived from a corresponding portion of the substrate to compare with the detected signal for detecting defects in the semiconductor device is considered to be

obvious variation in design, since the die-to-die method is well known in the art for using signals from two dice of the same substrate to compare with each other for detecting defects on the substrate, thus would have been obvious to one skilled in the art to use the die-to-die method in the Miyoshi et al. apparatus for detecting the defects in the semiconductor device.

Claims 31-41, 43-44, 51-52 and 56-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (4,996,434).

Tanaka (4,996,434) disclose all the features as discussed above except that an electron beam having at least 50 nm wide as recited in claims 31-33, 38-40, and 43-44; means for comparing images from two different locations on the substrate for detecting defects as recited in claim 34; an electron beam with an irradiance of greater than 1 milliamp per steradian as recited in claim 37; an image of a pattern feature produced by averaging between 2 to 256 inclusive repeated frames as recited in claim 51; a frame size varied in the range of 512 to 4096 pixels tall by 4 to 4096 wide as recited in claim 52; a subsystem for delivering an oxidizing plasma into the vacuum chamber as recited in claim 56; the oxidizing plasma used to clean the particle beam column as recited in claim 57; and the oxidizing plasma used to clean the substrate as recited in claim 58.

Using an electron beam having at least 50 nm wide or an electron beam with an irradiance of greater than 1 milliamp per steradian is considered to be obvious variation in design, since the electron beam having at least 50 nm wide is well known in the art and in an electron apparatus for measuring and testing a sample, as disclosed in the Miyoshi et al. reference (4,912,052) (see col.

9, lines 39-41); and Tanaka also discloses that the electron optics system adjustment unit 60 controls the electron optics system 30 for adjusting the beam path alignment, a beam current, a beam diameter and the astigmatism of a beam spot (see col. 5, lines 51-61, and col. 10, line 59 to col. 11, line 3) for detecting the defects of or less than $0.1\mu\text{m}$ (see col. 13, lines 55-59).

Therefore, it would have been obvious to one skilled in the art to use the electron beam having at least 50 nm wide or the electron beam with an irradiance of greater than 1 milliamp per steradian in the Tanaka apparatus for detecting defects in the mask.

Comparing the images from two different locations on the substrate for detecting defects is considered to be obvious variation in design, since it is well known in the art to use the die-to-die comparing type which uses at least two images from two different locations on the substrate for detecting defects, as disclosed in the Tanaka reference (see col. 1, lines 46-49), thus would have been obvious to one skilled in the art to use the die-to-die comparing method which uses at least two images from two different locations on the substrate in the Tanaka apparatus for detecting defects in the mask.

Producing the image of the pattern feature having 2 to 256 frames and/or the frame size varied in the range of 512 to 4096 pixels tall by 4 to 4096 wide is considered to be obvious variation in design, since the size and shape of an element are consisting of ones of sizing and shaping means of that element, thus would have been obvious to one skilled in the art to scan the mask or wafer to produce the image of the pattern feature having 2 to 256 frames and the frame size varied in the range of 512 to 4096 pixels tall by 4 to 4096 wide in the Tanaka apparatus for

observing the image to detect defects in the mask.

Using the subsystem for delivering an oxidizing plasma into the vacuum chamber to clean the particle beam column and the substrate is considered to be obvious variation in design, since it is well known in the art to use the oxidizing plasma for cleaning electron optical elements and the substrate, as disclosed in the Bacchetti et al. reference (4,665,315), thus would have been obvious to one skilled in the art to use the subsystem for delivering an oxidizing plasma into the vacuum chamber to clean the particle beam column and the substrate in the Tanaka apparatus for eliminating contaminations in the apparatus.

10) *Reasons for indicating allowable subject matter of claims 1-8*

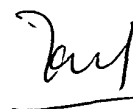
The prior art fails to disclose a system and/or method for automatically inspecting an optical mask, which includes means for examining a backscattered electron waveform and a secondary electron waveform to determine construction features of a conductive optical mask as recited in claims 1 and 5.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner *Kiet T. Nguyen* whose telephone number is (703) 308-4855.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956.

Papers related to Art Unit 2881 applications **only** may be submitted to Art Unit 2881 by facsimile transmission. Any transmission not to be considered an official response must be clearly marked "DRAFT". The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Art Unit 2881 Fax Center number is (703) 308-7723.

K.T.N/Primary
September 27, 2001



KIET T. NGUYEN
PRIMARY EXAMINER